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(71) Applicant(s)
Alform Extrusions Limited

(Incorporated in the United Kingdom)

Unit 6 & 7, Holton Heath Trading Park, Holton Heath, POOLE, Dorset, BH16 6LF, United Kingdom

(72) Inventor(s)
Roger Pedley

(74) Agent and/or Address for Service
Batchellor, Kirk & Co
2 Pear Tree Court, Farringdon Road, LONDON, EC1R 0DS, United Kingdom

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(56) Documents Cited
GB 2215297 A GB 2075946 A GB 1185478 A
GB 0831087 A GB 0548642 A GB 0329133 A
EP 0637565 A1

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UK CL (Edition O) B8B BES , B8M MGB MGE MGF
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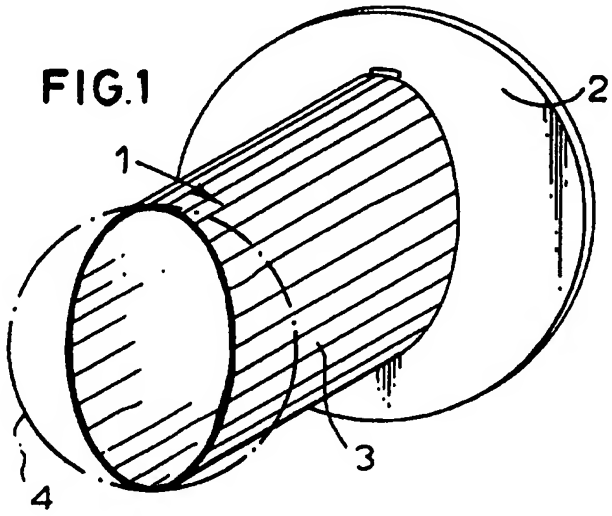
(54) WINDING DRUM

(57) A winding drum is made with a core (1) which is approximately 5% out-of-round. In consequence an elongate and pliant material wound on the drum can be unwound without backwinding. In Fig 1 planks 3 extend between elliptical grooves in discs 2. Alternatively a radial projection may extend adjacent a cylindrical drum from one flange to the other.

FIG.1



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

FIG.1

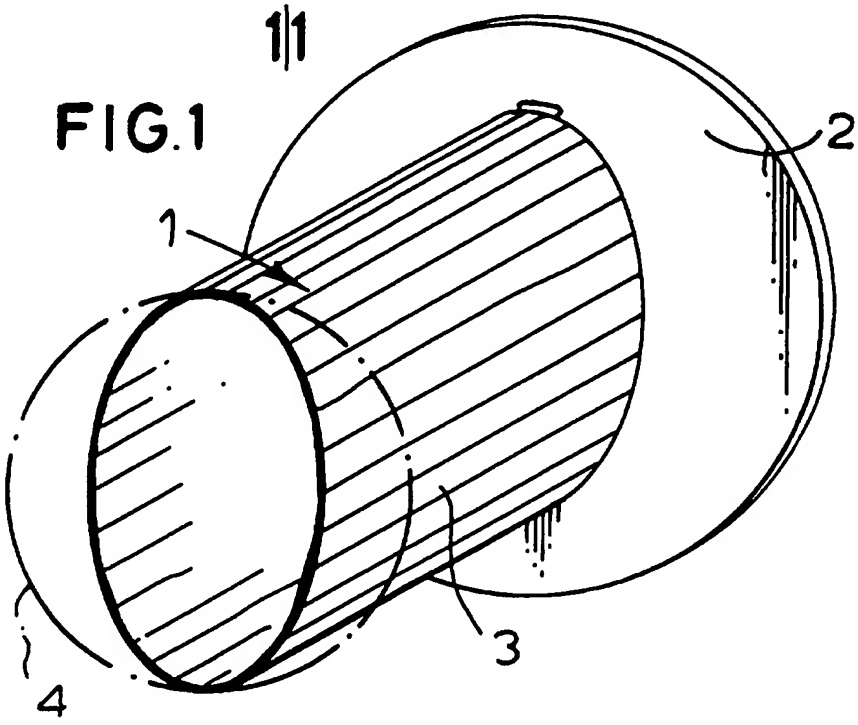


FIG.2A

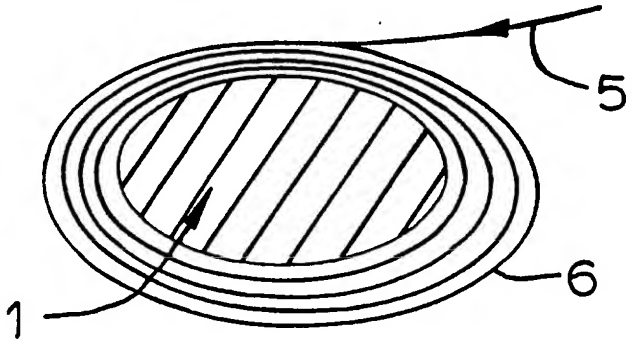
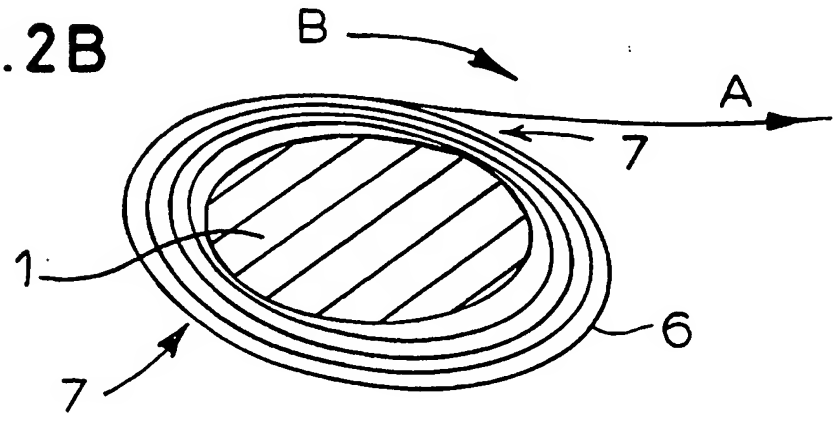


FIG.2B



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WINDING DRUM

The winding drum of the present invention is especially, although not exclusively, for use to store an elongate bar or rod of a ductile metal such as aluminium or copper for delivery to a continuous extrusion machine or for storage of the elongate extrusion from a continuous extrusion machine. The winding drum may also be useful for the storage of many other types of elongate materials or articles having similar characteristics of flexibility such as large section coaxial conductive or fibre optic cable or power cable. The winding drum may also be useful for the storage of resiliently flexible elongate materials. It will be appreciated that such articles are sufficiently stiff that they can support their own weight when a length of the article several times its diameter is cantilever supported. For the purposes of the following description such non-floppy articles will be referred to as pliable articles. The winding drum of the present invention may also be useful in the storage of articulate articles of invariable length.

Winding drums for the aforementioned purpose are well known in the art. Conventional winding drums are made by forming two large diameter disks, usually from wood. The centre of each disk is adapted to be supported on an axle usually by the simple provision of a hole. A circular groove of nominally constant radius is then formed coaxially in one face of each disk. Ends of a number of planks of wood are then fastened into the groove in each of the two facing disks so forming a nominally cylindrical core with flanges

extending radially from the rim of the core. A securing hole is formed in one of the core or the flange to receive the end of an article to be wound on the drum.

A common way of wrapping an article onto a drum of this type is to feed the end of the article over the external drum surface through the securing hole. The end of the article may then be held in place by a staple or the like although it is possible to rely on the article jamming in the hole. The drum is then rotated to draw the article onto the core. A traverse mechanism is usually employed so that the element being wound onto the core is moved laterally with respect to the previously wrapped element. When the article has been wound to cover the whole surface of the core, the traverse mechanism is reversed to wind a second layer onto the first layer of windings. Many layers of windings may be formed.

To unwind the article from the drum the drum is supported to rotate freely about the horizontal central axis of the drum and tension is applied to the free end of the article.

When an article is being unwound from a drum the weight of the article on one side of the core has a tendency to make the article rotate with respect to the core in the same direction as the unwinding direction and causes the end of the article secured in the hole to be forced through the hole, this phenomenon is known as backwinding. Large quantities of the article can be displaced through the hole by backwinding and have to be cut off and thrown away. In some cases the backwinding windings on the drum may jam in unpredictable places and cause the article to be kinked or otherwise deformed. In some cases deformation of the article

may spoil as much as a third of the article on the drum.

It is the object of the present invention to alleviate the problem of backwinding.

In order to alleviate the aforementioned problem the present invention provides a winding drum comprising a core which provides a non-cylindrical nominal winding surface.

According to another aspect of the present invention provides a winding drum having a nominally cylindrical core with at least one radial projection extending from one axial end of the core to the other.

Thus, the invention consists of making the core so that the surface of the core onto which the article is wrapped is not of constant radius.

As an article is wound onto a winding drum according to the invention the article is wound to a shape patterned on the section of the core, the pliant article tends to retain this shape, and so , when it is being unwound, the layers of the article can only backwind relative to the core until the innermost layer jams against the core's largest radius. The outer layers are jammed by the innermost layer being slightly deformed outwards to press against and prevent rotation of the overlying layers.

It will be appreciated that the core according to the present invention must be so shaped that the article being wound onto it will elastically deform to follow the nominal section of the core. A core constructed so that it has a non-cylindrical surface, e.g. a knurled or corrugated surface, but which will cause an article wound onto it to be wound as if onto a cylindrical section core has a nominally cylindrical surface and does not fall within the scope of

the present invention.

The degree to which the core needs to be non-circular is not large and probably depends upon the stiffness of the article and the minimum radius of the core in a relationship which is not understood, however, an article of circular section aluminium bar of approximately 10mm diameter wound on an elliptical section core of minimum radius approximately 1000mm requires a maximum radius of approximately 1050mm, i.e., five percent out-of-roundness.

It is believed that winding drums having cores with an out-of-roundness of about 5% will prevent backwinding on winding drums used to store cable like articles.

It may be possible to deduce a theoretical relationship between the characteristics of stiffness, cross section and elasticity which determine the optimum out-of-roundness of a core onto which an article may be wound without detriment to the article and which adequately prevents backwinding. However, it is a simple matter to determine a useful degree of out-of-roundness of the core by experiment. To this end the researcher will simply try winding a variety of known (or new) articles on to a drum or range of test winding drums having a known out-of-roundness. If upon unwinding there is negligible backwinding the out-of-roundness is satisfactory.

The core may be made with a single projection extending from one axial end of the core to the other the projection will preferably be somewhat rounded to form a lobe having a surface which progressively changes radius.

In a preferred embodiment the core has two diametrically opposite lobes which form an elliptical section or something approximating an elliptical section.

A conventional winding drum may be adapted to benefit from the invention by securing an elongate object, such as a bar, parallel to the rotary axis of the winding drum and against the external surface of the cylindrical core to form a the projection. The bar is preferably rounded since sharp corners formed on the drum are likely to be detrimental to the article by putting kinks, creases or other permanent deformations in it. This latter proposal advantageously allows existing drums to be modified to benefit from the invention. It may prove useful to be able to vary the out-of-roundness of the core, to which end the out-of-roundness may be made adjustable, for example by having a range of bars which can readily be exchanged.

Preferably the core has a substantially continuous surface, however, it is within the scope of the invention that the core is made of a plurality of circumferentially spaced planks, rods or bar like members, the members being spaced to define a notional surface of a radius sufficiently large to avoid the article being wound onto it being plastically deformed.

The winding drum according to the present invention is preferably formed from wood, metal, plastics or card in a manner similar to the winding drum of the prior art, however, the grooves in the disk faces are made non-circular and preferably elliptical. An alternative way of making the winding drum is to produce a pair of elliptical formers and to fasten the formers coaxially onto the opposing faces of the disks, the ends of planks are then fastened to the rims of the facing formers.

A winding drum constructed in accordance with the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view,

Figures 2A and 2B are diagrams illustrating the operation of the embodiment of figure 1.

In figure 1 a winding drum consists of a core 1 and a pair of disks 2 mounted one each on each end of the core 1. A hole is provided on the axis of each disk so that the winding drum can be mounted for rotation while an article is being wound on it or unwound from it. In figure 1 the disk nearest to the viewer is not shown so that the section of the core 1 can be more clearly seen.

The core 1 is formed from a plurality of elongate planks 3, the ends of which are received into an elliptical groove formed in the faces of the disks 2. A circle projected coaxially into the core 1 is illustrated by the dotted line 4 to show that the core 1 has an elliptical cross section.

Figure 2A shows diagrammatically what occurs when an article 5 such as 10mm aluminium alloy bar is wound onto a winding drum such as that of figure 1. The layers 6 of the article 5 take up an elliptical shape patterned on the section of the core 1.

In figure 2B the article 5 is being unwound from the drum by applying tension to the end of the article in the direction of the arrow A. Because of the difference in weight distribution from one side of the drum to the other,

there is a tendency for the article to backwind in the direction of arrow B as it is being unwound. The layers 6 of the article 5 all tend to rotate through about the same angle with respect to the drum until the innermost layer jams against the surface of the core 1. It will be appreciated that the core will tend to slightly increase the radius of the innermost layer at the jamming point 7 so that the immediately overlying layer is similarly disturbed thus jamming the overlying layer. This jamming effect progresses outwardly to each of the overlying layers 6 so that backwinding is substantially prevented.

CLAIMS

1. A winding drum comprising a core which provides a non-cylindrical nominal winding surface.

2. A winding drum according to claim 1 having a core so shaped that the article being wound onto it will elastically deform to follow the nominal section of the core.

3. A winding drum according to claim 1 or claim 2 wherein the core shape is out of round by substantially 5%.

4. A winding drum according to any one of claims 1 to 3 wherein the core has two diametrically opposite lobes which form a substantially elliptical section.

5. A winding drum according to any one of the preceding claims comprising a pair of formers of non-circular shape fastened coaxially one each to an inside face of an end disk of the drum, and a plurality of planks each having one end fastened to an edge of the former.

6. A winding drum having a nominally cylindrical core with at least one radial projection extending from one axial end of the core to the other.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9425672.4
Relevant Technical Fields (i) UK Cl (Ed.O) B8B (BES), B8M (MGB, MGE, MGF) (ii) Int Cl (Ed.6) B66D	Search Examiner MARTIN DAVEY Date of completion of Search 9 FEBRUARY 1996
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE: WPI	Documents considered relevant following a search in respect of Claims :- 1 TO 6

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	P:	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	E:	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	&:	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2215297 A	(TRENT POLYTECHNIC) see pivotal plates 8 in Figure 1 in particular	1 to 3 and 6
X	GB 831087	(REDLER CONVEYORS) see projections 18 from the drum 10 in particular	1 to 3
X	GB 329133	(NORDDEUTSCHE...AG) see movable bar C in Figure 1 in particular	1, 2, 6
X	EP 0637565 A1	(MEISSNER) see concave faces 6 on drum surface in particular	1 to 3
X	GB 548642	(HEAD) see drum 4 with ribs in Figures 1 and 6 in particular	1, 2
X	GB 2075946 A	(Z.F. AG) see varying diameter drum 10 in Figure 3 in particular	1, 2

Databases:The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

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GB 9425672.4

Continuation page

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 1185478	(SMITH) see the varying diameter drum in the drawing	1, 2